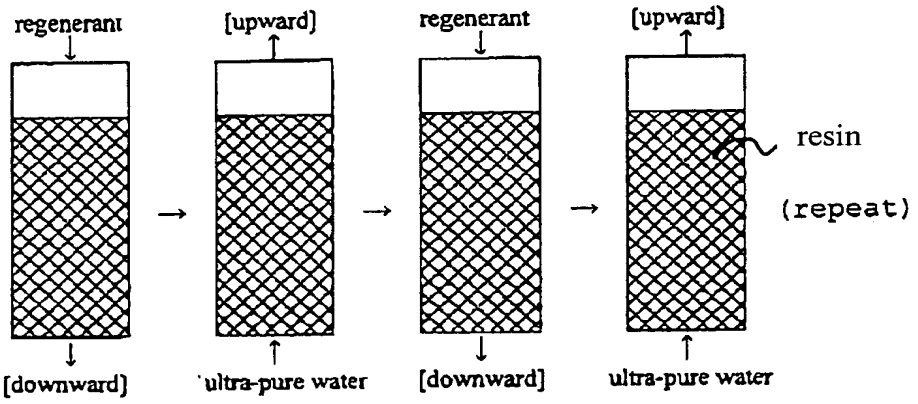
Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S Patent No. 3,711,401 to Hamilton et al. (hereinafter "the Hamilton patent") in view of U.S Patent No. 6,340,712 to Kunin et al. (hereinafter "the Kunin patent"). The Examiner maintains that it would have been obvious to one skilled in the art to subject the ion exchange resin based on the combination of the Hamilton patent and the Kunin patent to multiple regeneration and washing steps in order to ensure that the resins are adequately regenerated and washed. Applicants respectfully disagree.

The Hamilton patent discloses a regeneration method for dual bed ion exchange resins. The operation disclosed in the Hamilton patent is a rinsing (washing) operation of the ion exchange resin designed to remove any remaining regenerant. "Backwashing" is carried out, in the Hamilton method, to separate the weak resins and strong resins based on differences in their specific gravity or density.

The Kunin patent discloses a non-chloride containing regenerant composition and method for regenerating water softeners. The Kunin method does not include the repeated downward application of an aqueous solution of regenerant solution and an upward application of ultra-pure water as in the presently claimed invention.

The regeneration tower of the present invention may be depicted as follows:



The regenerant is one or the other of an acid or base compound appropriate to the ion exchange resin used in the present invention. In the operation of the ion exchange resin as described above, channeling of the regenerant as it passes through the ion exchange resin is generally avoided. Even if channeling occurs in a layer of the ion exchange resin, the channeling effect is broken, preventing the occurrence of non-uniform regeneration. This allows the ion exchange resin to be regenerated efficiently and homogeneously.

Additionally, in the present invention, the regeneration of the ion exchange resin is carried out through the use of an ion exchange resin tower (regeneration tower), which is different from the purifier towers in the methods disclosed in the cited prior art. In the present method, mixing of the regenerant into the purifier towers can be avoided. Thus, in the present invention, there is no need to interrupt the purification of an aqueous hydrogen peroxide solution.

It is known that the spent ion exchange resin is generally regenerated by a regenerant. For example, an anion exchange resin is typically regenerated by packing the anion exchange resin in a tower and, once or more, sequentially passing an alkali aqueous solution and an acid aqueous solution through the anion exchange resin tower.

This process is reviewed in detail in the Japanese language publication "Analytic Chemistry Handbook" published by Asakura Shoten. A copy of the relevant portions of this publication and an English language translation thereof were submitted with the Response After Final, dated December 19, 2002. The publication describes the operation of a basic ion exchange column, which may be summarized as follows:

1) The spent ion exchange resin is packed in a column;

2) The ion exchange resin is adequately washed by pure water (sometimes by backwashing);

3) HCl solution is passed through the washed resin in the column;

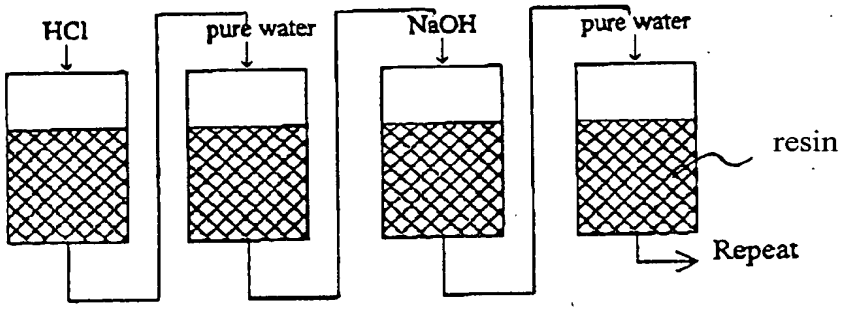
4) The HCl treated resin is washed by pure water;

5) NaOH solution is passed through the washed resin in the column to change the functional group of the ion-exchange resin to Na^+ or OH^- form;

6) The NaOH treated resin is washed using pure water; and

7) Steps 3) to 6) are repeated several times (typically, two or three times).

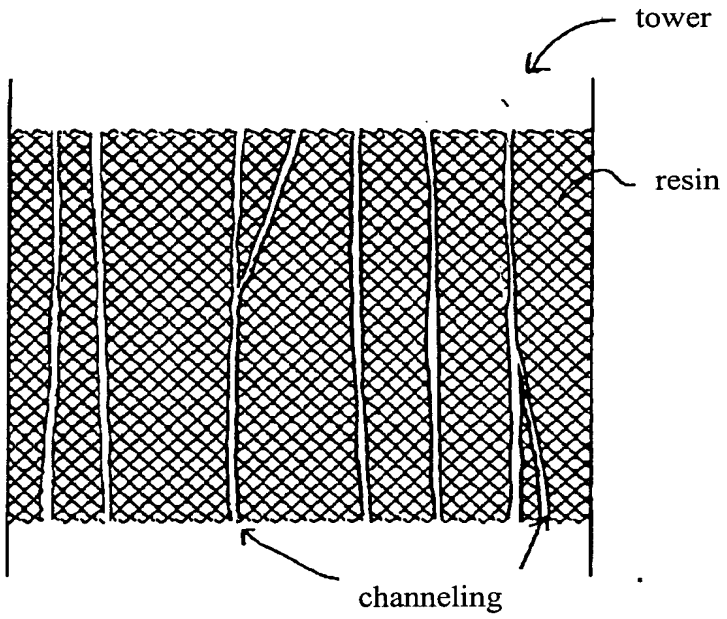
The process is shown in the schematic diagram below:



For resins regenerated by the method described above, a regenerant, such as NaOH or HCl, may remain in the ion exchange resin. This residual may act to prevent or retard the removal of ionic impurities from an aqueous hydrogen peroxide solution. The regeneration method described above is generally followed in the methods described in the Hamilton patent and the Kunin patent.

Further, in this conventional method, channels are formed ("channeling") through which much of the regenerant passes. Channeling leads to non-uniform contact between the regenerant and the ion exchange rein, which results in an ion exchange resin that is not homogeneously regenerated.

Channeling occurs when voids, created in the packing material of a column, cause the mobile phase and accompanying solutes to move more rapidly than the average flow velocity through the column. Channeling leads to band broadening. The voids are created by poor packing or by erosion of the packed bed.



The method disclosed by the Hamilton patent does not include the "intermediate service" of the present invention. Therefore, the unexpected improvement and effects described above are not disclosed or in any way suggested in the Hamilton patent:

> After column 20 has been regenerated the column is rinsed to remove any remaining regenerant. Typically the rinse effluent from column 20 is passed through column 30 to use up any exchangeable regenerant ions in the rinse effluent.
>
> Next, column 10 is back washed to remove any suspended matter filtered from the fluid being treated and other fines and to help to separate the weak and strong resins into distinct layers. Backwashing is carried out at this point because the density differences between strong and weak resins are greater when the resins are in the regenerated form. (Hamilton patent, col. 5, lines 4-15).

The "backwashing" disclosed in the Hamilton patent is carried out in order to separate the weak resins and the strong resins based on their different densities. The

"backwashing" disclosed in the Hamilton patent does not include passing liquid through the tower upward from the bottom of the tower as in the present invention. In the prior art, in order to wash the resin, a back wash regenerator and water are typically used. However, the combination of sequentially repeating the steps of "passing the regenerant solution through the tower downward from the top part of tower" and thereafter "passing water through the tower upward from the bottom of the tower" is not disclosed in the Hamilton patent.

Applicants have discovered a method of regenerating an ion exchange resin that includes sequential repeated application of an aqueous solution of regenerant from the top part of the regeneration tower in a downward direction followed by passing ultra-pure water through the regeneration tower in an upward direction from the bottom of the regeneration tower. The present method prevents channeling and provides an ion exchange resin that is more homogeneously regenerated than by using prior art methods.

No combination of the Hamilton patent or the Kunin patent teaches, describes, or otherwise suggests the method and/or the improvement of the present method. Therefore, the rejection of claims 1 and 2 under 35 U.S.C. § 103(a) should be withdrawn.

Claims 3 and 4 stand rejected under 35 U.S.C. § 103(a) as being obvious over the Hamilton patent in view of the Kunin patent and further in view of U.S. Patent No. 4,652,352 to Saieva et al. (hereinafter referred to as "the Saieva patent"). The Examiner maintains that it would have been obvious to one skilled in the art to subject the ion exchange resin based on the combination of the Hamilton patent and the Kunin patent to multiple regeneration and washing steps in order to ensure that the resins are adequately regenerated and washed and that it would have been obvious to use vinyl chloride in ion exchange resins as disclosed in the Saieva patent. Applicants respectfully disagree.

The Saieva patent discloses a process and apparatus for recovering metals from dilute solutions. In the Saieva patent, the ion exchange resin is used as the means to

recover the metals from dilute solution. The Saieva patent discloses a closed loop process and apparatus whereby metals may be recovered from spent electroplating rinse solutions for reuse in the electroplating bath with essentially no generation of waste.

As noted above, no combination of the Hamilton patent and the Kunin patent discloses, teaches, or suggests the present method of regenerating an ion exchange resin that includes sequential repeated application of an aqueous solution of regenerant from the top part of the regeneration tower in a downward direction followed by passing ultra-pure water through the regeneration tower in an upward direction from the bottom of the regeneration tower. Further, no combination of the Hamilton patent and the Kunin patent discloses, teaches, or suggests the improvement provided by the present method, i.e., preventing channeling and providing an ion exchange resin that is more homogeneously regenerated than obtained by prior art methods. Utilizing the material disclosed in the Saieva patent does not provide any motivation to use the method described above.

Therefore, the rejection of claims 3 and 4 under 35 U.S.C. § 103(a) should be withdrawn.

In view of the foregoing arguments and remarks, reconsideration of the rejections and allowance of claims 1-4 are respectfully requested.

Respectfully submitted,

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Marked-Up Version of Claim 1

1. (Amended) A method of regenerating an ion exchange resin, comprising the steps of:

packing a used ion exchange resin in a regeneration tower; and

sequentially repeating, at least twice, a step comprising passing an aqueous solution of regenerant through the regeneration tower downward from a top part of the regeneration tower and thereafter passing ultra-pure water through the regeneration tower upward from a bottom of the regeneration tower.